

Energy Efficient Economic Development
Community Energy Systems As Building Blocks

Report of the
**HUD/DOE SIXTH NATIONAL CONFERENCE
ON COMMUNITY ENERGY SYSTEMS**

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The DOE/HUD National Conference on Community Energy Systems is held each year in January in Washington, D.C.

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Introduction

This year's HUD-DOE Conference on Community Energy Systems (CES) marked an effort to demonstrate that multi-customer district heating systems are more than just means of providing thermal energy; they are an integral part of the community's infrastructure--*community energy systems*. These systems can be powerful tools in a cities' community and economic development programs if the local government officials take full advantage of their potential.

The sixth annual conference focused on the theme *Energy Efficient Economic Development: Community Energy Systems as Building Blocks*. Several real estate developers were invited to address the conference, discussing developers' needs, their attitudes toward community energy systems, and how communities can work with developers to encourage them to give favorable consideration to connecting to DHC systems.

With oil prices currently at a relatively low level, energy is not a high priority in the minds of developers or communities. But energy prices are expected to rise again. Mayor Steve Carlson of Jamestown, New York, asked the conference attendees, "Does anyone believe that the nation has reached long-term energy security?" A challenge for district heating advocates is to address future energy crises now, so that DHC systems will be in place as part of overall community energy systems when the energy price situation worsens.

Community energy systems fit into the agendas of both HUD and DOE, from slightly different perspectives. For DOE, district heating and cooling is a component of efforts to reach the National Energy Policy goal of adequate energy at reasonable cost. When a DHC system is fueled by municipal waste or a domestic fuel, it contributes to the efforts to reduce dependence upon foreign energy sources.

For HUD, community energy systems can be important components in community and economic development strategies. Several speakers addressed the use of district heating in attracting and retaining development in a city. A comprehensive energy plan, including district heating and cooling, can give a city a significant competitive edge. One speaker also pointed out that while energy recently has been a low priority on the general city agenda, it often is a "hidden component" in many of a city's major objectives, such as economic development or waste management.

Several speakers pointed out that DHC and municipal waste-to-energy facilities are perfect partners. The waste-to-energy plant can provide a stable, reliable source of energy to the DHC system, while the DHC system--especially if it has a summer cooling load as well as winter heating--is a perfect customer for the thermal energy produced by burning solid waste.

In some sessions, real estate developers explained the factors that go into their decisions--how and why they would choose district heating over a self-contained heating system. Other sessions focused on marketing--how a DHC developer can go about selling the concept of district heating to real estate developers and other potential customers.

The increasing prominence of entrepreneurs as DHC developers was evident in the conference. District heating is following the trend set by waste-to-energy as a fertile area for public/ private collaboration. More private companies are developing DHC systems--often buying the systems from utilities who previously owned them. The developers then work with the communities to make the systems viable and beneficial to the developers, the customers and the communities.

A recurring point is that district heating systems are not easy to implement. They are complex projects that involve a large number of institutional, technological, legal and financial issues; they require strong, determined leadership--the "local hero"--for success. And they are not feasible for every local situation. But when they are feasible, community energy systems can be among the most important projects a city can undertake--and one of the most rewarding.

Session 1

Welcome

Donna R. Fitzpatrick, *Assistant Secretary for Conservation and Renewable Energy, DOE*

Jack R. Stokvis, *Assistant Secretary for Community Planning and Development, R-UD*

Opening the conference, Donna Fitzpatrick presented DOE's perspective that district heating and cooling is a methodology that offers opportunities to further energy conservation goals, and to take advantage of renewable energy sources-particularly municipal waste-to-energy facilities. The National Energy Policy goal of adequate energy at reasonable cost requires diversity in energy sources. DOE's interest in district heating and cooling is directed at one of research and development. Thus far, conservation has contributed over 16 quads (quadrillion Btu's) of energy, which is more than increases of other energy sources and is the largest contributor to the national goal. She added that conservation has the potential to contribute **or** avoid another 15 quads over the next 15 to 20 years.

Fitzpatrick said that in Fiscal Year 1988, DOE will be dedicating its efforts in district heating and cooling to research of advanced technologies. These include: advanced fluids, chillers, ice slurries, metering, heat exchangers, building connections and state regulation as it relates to facilitating (or hindering) development. She then announced that DOE plans to make available \$600,000 for research in cooling systems and technology this year.

She told the audience that, in order to develop a district heating and cooling system, they need the following:

- Anchor customers who will lead smaller customers in connecting and supporting the system;
- Support from local elected and appointed officials;
- Owner/operator/customer cooperation;
- Realistically sized systems with the ability to grow;
- Programs of community education designed to garner community support;
- Systems that have the potential to solve community problems, such as solid waste or air quality; and
- An atmosphere conducive to innovation at the local level.

Fitzpatrick finally cautioned the audience to monitor the budget process to make sure the national energy programs do not lose the limited budgets they now have.

Jack Stokvis of HUD continued the welcome. He explained how district heating and cooling or community energy systems fit the HUD agenda of economic development, affordable housing, urban competitiveness, and public sector entrepreneurship. Stokvis sees HUD's role as that of a facilitator. He stated that in the long term, HUD expects its investment in community energy systems to help achieve:

- Reduction in the capital expenditure cost of individual buildings;
- Reduced operating and maintenance costs in buildings;
- Improved urban air quality;
- Fuel savings;
- Reduced landfill costs; and
- Improvement in urban competitiveness.

He stressed the importance of reinforcing urban competitiveness as it relates to national issues. Companies based in cities and connected to district heating systems may be better able to compete in world markets by taking advantage of lower energy costs. Lower cost of doing business in American cities can have a positive impact on balance of trade, energy imports, the dollar and other national priorities, according to Stokvis.

In closing, he cited how HUD's expanded role in energy has been vital in assisting communities to become more competitive.

Session 2

The Role of Energy in Development

James A- Ratner, *President, Forest City Rental Properties, Cleveland, Ohio*

James Ratner opened his remarks by discussing recent trends in urban development. He first cautioned that developers respond to opportunities, that they generally are not leaders, but reactors. Ratner noted that a full-time developer is a new phenomenon; for years development has been a sideline occupation. He reminded the audience that real estate is a high risk business with cyclical swings that exceed those of the rest of the economy.

The current trends and conditions in the industry are fierce competition, specialization and target marketing, and "bigness." Bigness has led to undercapitalized firms using equity investors with high return requirements forcing a long-term business-real estate-to demonstrate high short-term returns to attract investors. This causes the projected "sale value" to dominate financial analysis, which now must be more sophisticated.

Concerning energy, Ratner said that developers are not driven by energy efficiency due to energy cost allocation formulas and the pass-through nature of leases; that developers perceive energy as a political, not economic, problem; and that the industry does not have the self discipline to collectively improve energy efficiency.

He felt that the developers' attitudes toward energy will not change unless something forces them to look at efficiency, i.e., operating and maintenance costs. This could come from three directions. First, tenants in the future may take a harder look at energy and operating costs. If tenants begin to rebel at allocation formulas and cost pass-throughs, efficiency will become important. Second, tax policy has demonstrated that it can drive efficiency by making efficiency a public policy issue. Finally, the public sector is the single largest tenant group in the United States. If government took advantage of its position and made energy a determinant in lease and design decisions, it would have enormous leverage in forcing efficiency.

In theory, Ratner agreed that community energy systems should be important, in that a developer could save cash and limit the square feet devoted to building mechanicals by connecting to a system. However, due to "the age of [steam] plant facilities, [steam] distribution systems' inefficiencies and the use of expensive primary fuels (oil and natural gas) rather than by-products [solid waste and/or cogeneration] has meant the promised economic advantages have not materialized Utility [gas and electric] pricing policy of bulk rates with few demand charges, and building heat gain have reduced the advantages of community energy systems." Also, the willingness of utilities to defray significant percentages of initial capital costs to developers has diminished the attractiveness of community energy systems.

Ratner admonished the district heating and cooling industry to update plants and distribution systems, and to increase reliance on nonprimary fuels to lower costs. He said that the real estate industry is becoming based on real economic factors rather than to being driven by tax incentives, and predicted that energy will become increasingly an economic issue.

*Session 3***Factors in Real Estate Developer's Decisions**

P. David Sowell, *Special Assistant for Economic Development, HUD (Moderator)*

James E. Carley, *Carley Capital Group, Madison, Wisconsin*

Brian Murphy, *Vice President, The Prudential Property Co., Newark, New Jersey*

Bruce Long, *Vice President-Engineering, The Prudential Property Co., Newark, New Jersey*

David Sowell opened the session by introducing James Carley, who is active as a developer throughout the country. His group is involved principally with housing, mid-priced hotels, and mixed-use business parks, often in concert with universities.

Carley said that the developer's concern is maximizing comfort while minimizing cost, and that the Carley Capital Group uses a variety of energy systems, depending on the local climate and their anticipated length of ownership. Typically, better energy systems raise building value, both in terms of sale and lease price, he added.

As a developer, he feels it is best to pass on the initial cost and the system operating cost, and to spread that cost over as many users as possible. Since community energy systems generally require substantial initial investment, it is especially important to find participants willing to carry the negative cash flows that inevitably occur.

Carley feels that the community should take a role in developing such systems. He emphasized that there can be no return from future or current businesses if the community is unwilling -to make long term investments. If the community is unwilling, businesses and developers will look elsewhere. The level of risk dictates public-private partnerships, particularly in such capital intensive investments.

Brian Murphy described how Prudential's investment outlook has changed over the years from lender to financial partner to developer.

He stressed that energy systems are important to the well being of both owners and tenants. Murphy discussed some of the items Prudential considers critical in evaluating feasibility for purchasing or developing buildings. Prudential is a long term investor, he emphasized, using a 10-year projection period. The four factors considered critical are:

- Marketability of location and quality of space and tenants.
- How the property is leased today -- the structure of the lease and tenancy is critical to protect long term investment.
- Physical quality and cost of operation of a district heating system(if connected). If the system is abandoned, boiler addition costs are owner expenses.
- Property management considerations. Prudential has ultimate responsibility, and wishes to avoid bad situations.

Prudential's Bruce Long addressed the company's energy concerns, citing some examples. He cautioned that no matter how sophisticated the building energy management system, people still are required to operate and maintain it and to make correct decisions.

His first example was the Interplex complex in Princeton, New Jersey. Interplex was specifically designed to take advantage of state-of-the art energy-saving designs and technology. The design of the buildings was driven by energy considerations, and energy consumption was reduced by 60% over conventional buildings. However, when the tenant occupied the building, the tenant preferred more conventional lighting, and used operation schedules unsuited to the building design. Major changes were made to suit the tenant's needs. The moral of the story is that the building energy system must be reliable and flexible to meet tenant needs.

Prudential owns a shopping mall in Omaha, Nebraska, that includes a total energy system providing energy to all but the anchor stores. The system offers power at a lower cost than the local utility, even with built-in escalation clauses. The system works well.

A Prudential-owned hotel in Nashville, Tennessee, is connected to Nashville's steam and chilled water system. The per-room energy cost is the same as experienced at other hotels. Prudential saves

by having no mechanical rooms (non-leasable space) and lower labor costs (the building requires no operating engineers). The connection and system is basically "bother-free" to the owner.

Long recalled a bad experience with the steam system in Pittsburgh (formerly the Duquesne Light, now the PACT system). That system's distribution losses and fuel costs had risen to a point that a conversion to an in building boiler system offered a one year payback. Buildings in New York City and Boston on steam systems, however, have not converted due to extensive conversion costs, loss of space and stack requirements. Long does have concerns on the reliability of the steam systems in those cities, but at this point plans to remain on as customers. In closing, he recommended the use of community energy systems in business and office parks.

Sowell closed the session by reminding the audience that the tenants' needs drive the project, and energy is an important part of the landlord-tenant equation. Modernization and constant maintenance of community energy systems cannot be overlooked. These systems must remain reliable and cost efficient.

Session 4

Development and Energy: Public/Private Collaboration in Hartford

Robert Thornton, *Senior Marketing Consultant,*

Affiliated Resources Corp., Hartford, Connecticut (Moderator)

Anthony Mirabella, *Vice President-Business Development,*

Affiliated Resources Corp., Hartford, Connecticut

Howard M. Winterson, Jr., *Secretary and Counsel,*

Affiliated Resources Corp., Hartford, Connecticut

Nicholas Carbone, *Principal, Largo/ Hartford Inc., Hartford, Connecticut*

Joseph Levy, *Investment Director, AETNA Bond Investors, Hartford, Connecticut*

John Wardlaw, *Executive Director, Hartford Housing Authority, Hartford, Connecticut*

Following Rob Thornton's introduction, Tony Mirabella related the beginning of Hartford's district heating and cooling (DHC) system. It began in 1962 with the redevelopment of Constitution Plaza in downtown Hartford, and the cooperation of Phoenix and Traveler's Insurance and Hartford Gas Company (now Connecticut Natural Gas, owner of Affiliated Resources Corp., Energy Networks, Inc., and the Hartford Steam Company). These three decided to develop the first district cooling system, to offer a reliable source of air conditioning and to burn natural gas during the summer months when gas was cheap and customer demand low.

Mirabella reported that the system began operation in 1962, and experienced steady growth and expansion through the 1960s. In the 1970s growth and demand fell off due to rapid price increases and building energy conservation brought about by the energy crises of the decade. Finally, in the late 1970s the new Hartford Civic Center was added to the system, and the expansion-minded company has added capacity and takes on new customers.

Energy Networks, Inc., is a marketing company, Howard Winterson pointed out. The company is now involved with the development of a cogeneration-based DHC system as a partner in the Capitol District Energy Company (CDEC). This came about due to an opportunity presented to Affiliated Resources by a potential customer. The problem (and opportunity) was how to serve new developments with tight construction schedules that were too far from the existing district heating and cooling system to make connection economically and technically. The solution, he explained, was to take advantage of existing excess boiler and chiller capacity, while developing a cogeneration system as the long-term energy supplier. This required extensive negotiations and cooperation with and by the partners, and local and state government. Winterson noted that the cooperation required a series of trade-offs for permits,

easements, etc., in order to meet schedules and to deliver energy when needed. He emphasized the need to work and talk with people, and to not give up.

Nick Carbone, former mayor of Hartford, is the developer of two high-rise residential buildings and an office tower outside of downtown. Carbone identified building.mechanicals as one place he could reduce cost and approached Affiliated Resources Corp. for heat and air conditioning. As a result, he was able to convert over 10,000 square feet of space from mechanical rooms to leasable space. Carbone realized that to compete for commercial tenants, he needed to offer downtown quality but at a lower price. By eliminating the mechanical costs, he was able to do that. In the residential units, he calculated a savings of \$40 per month per dwelling unit.

Carbone believes that district heating and cooling will help keep Hartford competitive over the next 15 years. He feels that community energy systems favor Hartford's economy, since much of Hartford's energy use is dominated by central computer facilities and much of Connecticut's power comes from nuclear generation. Companies save money using central chilled water and avoid demand charges, particularly during off-peak hours when computer rooms are active. Insurance companies are a large generator of waste paper, which caused AETNA to investigate gas and trash fired cogeneration in 1984. Joseph Levy said that -AETNA's commitment to being a good corporate neighbor ruled out the trash burning option for aesthetic reasons. However, the company was still interested in on-site cogeneration for cost saving and investment purposes. When AETNA was approached to participate in the CDEC project, they were interested. They signed a steam and chilled water buy-sell agreement in 1986, and began the design of a 56 MW gas-fired cogeneration plant scheduled for startup in August 1988. AETNA will take 11 MW of power and sell the remainder to the grid; Levy estimates a savings of 20 to 25% compared to current energy costs.

He pointed out that his investment was based on criteria commensurate with other AETNA investments, and it is an example of private enterprise working with government (most of the state government buildings in the area will eventually connect to the heating and cooling system). The project was financed in taxable markets and the concept of privatization is enhanced by the new tax laws. Cogeneration projects based on real economics can be attractive investments in taxable markets for insurance and pension fund investors such as AETNA, Levy concluded.

John Wardlaw looked at the future. He is responsible for thousands of units of assisted housing, many of which have on-site central heating systems-- some of which are aging and troublesome. Wardlaw feels that managing people and housing units is enough work, and that managing energy systems is not what public housing authorities are good at. Hartford Housing Authority has one elderly highrise building on the downtown system and Wardlaw noted that the Authority is pleased with the system. He remarked that public housing and district heating are a perfect match with a potential for positive community impact. In the future hopes that he can he turn over responsibility for heating and that public housing can form the basis of new district heating and cooling systems in Hartford.

Session 5
Luncheon Speakers

Janice S. Golec, *Deputy Assistant Secretary for Program Development, HUD*

Steven B. Carlson, *Mayor, Jamestown, New York*

Ms. Golec introduced the luncheon speaker, Mayor Steve Carlson of Jamestown, New York, noting that it seemed better to have someone outside the federal government talk about economic development. Mayor Carlson was selected due to his city's success in developing a district heating system that has greatly aided economic development in Jamestown. Carlson, she added, was identified as one of the nation's outstanding local leaders by *U.S. News and World Report* and has been recognized by the United States Conference of Mayors and the International District Heating and Cooling Association for his contributions to the development of district heating and cooling.

Mayor Carlson began by asking "Does anyone believe that the nation has reached long term energy security?" There are, he pointed out, cheap oil and gas, energy efficient appliances and great strides made by conservation. On the other hand, he continued, American ships are escorting oil tankers in the Middle East, oil imports are expanding, domestic oil companies are not drilling due to low prices, and utility prices are still too high. He was not ready to claim sufficient energy security.

"Local officials," Carlson said, "could make no better energy investment than to develop infrastructures that conserve energy and provide flexibility in fuel sources in order to insure continued economic growth." He went on to point out that mayors need help from the private sector and the federal government to make energy an issue that can compete on a mayor's agenda with such items as drug abuse, homelessness, education and other pressing urban issues with vocal representation.

Virtually every city has the potential to develop energy systems that can offer savings, he said; but the mayors need help in finding the projects and resources, and they need support and proposals to build projects. He then challenged the private sector to help city hall to link serious system developers with viable projects that actually get built in cities.

The mayor stated that district heating and cooling developers must present themselves as catalysts for economic and community development. He offered three points:

- A system developer presents a new business that can be attracted to a city. The potential of attracting a new business will catch a mayor's attention.
- District heating and cooling can provide significant cost savings and energy security to existing and potential downtown developments.
- Significant development of infrastructure of any kind gives a city "development momentum." It helps a city to appear aggressive, forward-looking and innovative--essential characteristics in attracting private sector investment.

Carlson recounted the history of Jamestown's system and the economic developments that have been influenced in part by the existence of the coal-fired, cogenerating hot water heating system that his city has built, which offers energy at \$7.00/MMBtu. He concluded with the following observations based on his experiences.

- In Jamestown, industry that was once skeptical of the system is now pushing for inclusion.
- The system provided visible air quality improvement in downtown Jamestown.
- Economic development opportunities are created by a DHC system.
- Take advantage of low interest rates. (Jamestown used general obligation bonds.)
- Involve the private sector in the decision process.
- It is essential to educate the public on the benefits.
- If the system looks economically viable, go with it.

Mayor Carlson ended by stressing that he believes it is vitally important for the federal and state governments to continue to assist local governments with funding.

Session 6

Marketing the Community Energy Systems Concept to Communities

Stuart Temple, *PPI Consultants, Kensington, Connecticut (Moderator)*

Gordon Bloomquist, *Washington State Energy Office*

Monica Westerlund, *Strategy Communications, Minneapolis, Minnesota*

R. Michael French, *City of Louisville, Kentucky*

Opening the session, moderator **Stuart Temple** summarized a major common thread of the panel's presentations: "Our role as marketers is to take district heating and cooling technology and deliver it to the people who will benefit. The important thing is that we assess the audience and the situation we are dealing with and not go out there unprepared. Each situation must be carefully studied, planned, and worked properly to develop into a success."

Gordon Bloomquist of the Washington State Energy Office began the session with a description of strategies and materials his office has developed to promote district heating. "Our main role has been to make policymakers comfortable with the idea of district heating," he said.

His office has developed a computer program called HeatPlan that makes it possible to present specific information about the potential of a project. The quick survey of buildings used to gather the data used by HeatPlan costs no more than \$3,000; these surveys have been funded by oil overcharge monies, the Department of Energy, and the local utility. HeatPlan "allows us to come to a city council and show them on paper that there actually is a potential project in the community," Bloomquist said. His office is now developing a graphic version of the program, HeatMap, that will allow visual demonstration of various scenarios of district heating possibilities for all surveyed buildings.

Using HeatPlan, the energy office has done quick studies of district heating potential in over 100 cities in Washington, Oregon, Idaho, and Montana, and detailed studies in a smaller number of cities.

Bloomquist discussed the concept of the "local hero," a person or institution focusing on what needs to be done and carrying on the fight for the project once the initial acceptance and enthusiasm have been established. The energy office has developed two video presentations: one that shows some Scandinavian DHC techniques, and one that focuses more on district heating activities in the U.S.

The office has organized trips to Scandinavia for local and state government officials to visit DHC systems there. The energy office also produced a district heating guide that deals with such issues as ownership, operation, financing, franchises, and contracts; and it is preparing a series of brochures for communities to use in marketing the concept of community energy systems.

Michael French, director of public works for the city of Louisville, said he has been trying to sell a district heating and cooling system to his the last five years. He described his office's often frustrating but now promising campaign to develop district heating and cooling in Louisville.

French explained that his office completed studies that show the desirability, feasibility, and almost-competitive cost of a district heating/cooling system in parts of the downtown area, using the abundant 57° F underground water nearby as the heat source. The economic development unit of the city was briefed and knows whom to recruit and how to bring the beginning system into reality. Yet the system has not been built. French cited some factors in the delay:

- An inexpensive energy market and the inability of community decisionmakers to realize that it cannot last much longer.
 - Unexpected rises in labor and pipe costs.
 - The difficulty of teaching policymakers what is involved in converting cool underground water into a source of heating and cooling-
- A long drought. This kept the water table abnormally low and postponed a sense of urgency about finding uses for the underground water that will flood downtown basements if some of it is not extracted.

- The failure of two "metro" referenda that could have been "the immediate salvation of the sale of the system."
- The fragmenting presence of so many "fiefdoms" in the county (it has 96 mayors).
- A law restricting many public offices to one-year terms, which makes it harder for officials to initiate and carry through longterm projects.
- A climate with a much larger number of heating degree days than cooling degree days.

Nevertheless, French feels optimistic. Louisville's citizens recently voted to let its mayors serve for up to three terms instead of just one, which means the present mayor, a DHC enthusiast, could have time to see a project through. The city has good corporate structures to provide a workable framework for the effort. Moreover, public acceptance and interest are extremely high, as shown in late December 1987 by the "overwhelming" response at a public meeting about district heating and cooling and a radio broadcast of that meeting.

French said he hoped district heating and cooling in Louisville ultimately could be run through a private corporate structure rather than by a government agency, but that any developer at this point would be taking a risk because the economics are still not quite competitive. (Bloomquist pointed out that, by contrast, in Washington state there is about a 40% energy cost reduction by using district heating in downtown buildings.)

The final speaker, **Monica Westerlund** of Strategy Communications in Minneapolis, was associated for eight years with the development of district heating in St. Paul. She shared some marketing concepts, based on the fundamental question, "How can we inform, educate, convince, and then move policy makers to action on the most ideal system possible?"

First, she said, you--the district heating advocate--must plan strategies and tactics and set goals and objectives for your entire campaign. Setting objectives helps to maintain a marketing momentum and to keep your own commitment going, since you can celebrate small victories along the way and see clearly where you are in relation to your goal.

Westerlund suggested that you--as advocate--investigate the community's history with past projects, in order to assess the track record, identify potential leadership, learn why failures and successes occurred, and understand in general how the community functions. She urged the advocate to learn about district heating experiences of other communities, but added that what worked well in one community will not necessarily work in another.

Find out the the citizens' concerns and be ready with answers, she said. In fact, it is your responsibility as the advocate to do a lot of background research and planning so that your answers will be credible and can convince others of the worth of district heating. Credibility will be lost, however, if you, or over-enthusiastic community leaders, promise more than can really be delivered.

Westerlund recounted the success of district heating in St. Paul, and emphasized that while the extremely supportive mayor was a key factor in the success of district heating projects there, his ideas and enthusiasm could not have been carried forward without concrete actions and planning. For example, he promoted district heating as part of an overall energy-efficiency program, which made the district heating program more credible. Even those people not in the business neighborhoods that directly benefit from district heating could see that the program, including district heating, would help St. Paul survive and be an economical place to live. He also assembled a board of directors for the project consisting of people who would be important to the success or failure of the project. Eventually, "we came out with one of the best systems possible for St. Paul. It is a matter of informing and educating credibly, so that they know that you know what you are doing."

She stressed the importance of numerous educational presentations made to established community groups in St. Paul, both downtown and in the neighborhoods. The goal was not to get formal support, but to create awareness and understanding so that there would not be opposition to the project simply because it was benefitting the downtown area only; this understanding also would help future expansion to go more smoothly.

She emphasized the importance of going beyond traditional groups, such as the Rotary Club, and reaching out to a wider audience. "If you get at all levels of a company or a community, you will create more groundswell of support. If you educate only at the top, the information may not disseminate and the support may not be as solid. The groups you see will appreciate you because you thought they were important enough to address." Moderator Temple's comment near the close of the session reflected the general agreement of the panelists and most audience members: "Don't ignore anyone in the community. You don't always know who your audience is going to be in this game. You're out there plowing ground- the right seed in the right area will grow eventually."

Session 7

Economic Rewards of Community Energy Systems

Steven B. Carlson, *Mayor, City of Jamestown, New York (Moderator)*

Donald F. Killeen, *City of Lincoln, Nebraska*

Frederick Martin, Jr., *City of Camden, New Jersey*

Wallace McOuat, *W. G. McOuat and Associates, San Francisco, California*

John J. Lyons, *City of Springfield, Massachusetts*

Mayor Carlson opened by declaring that he had already said enough at lunch. He introduced Don Killeen, who led Lincoln's Phase I district heating and cooling evaluation.

Killeen described the background of the project, which began with a DOE grant in 1985. Originally, the project looked at a 16-block redevelopment area using water source heat pumps based on effluent from Lincoln's wastewater treatment plant. During the assessment, Lincoln entered negotiations with a developer for a six-block project within the larger area. The city presented the concept, but the developer was concerned about reliability and Lincoln's ability to deliver and guarantee cost. Lincoln then decided to isolate the six-block area to pinpoint the costs. The effluent-based system turned out economically infeasible. However, Lincoln had an alternative based on groundwater which, after well testing, proved feasible.

The city then calculated and presented the savings potential to the developer. Killeen reported that the estimates were capital savings of 2.6% of an approximately \$100 million project, with annual and on-going energy cost savings of 22.8% over conventional energy sources. This has been used as a city negotiating tool, but as yet no final agreement has been reached.

From an economic development perspective, the proposed system has helped to narrow the project financial gap. Ultimately, Lincoln would expand the system to use the wastewater effluent. Lincoln also is investigating using water source heat pumps for a city-county government complex and a new jail facility. Eventually the systems could be linked. Killeen added that one of the key design elements was the use of thermal storage (cooling) to reduce demand charges.

The next speaker was **Fred Martin**, Utility Director of Camden. His city received a DOE Phase I grant in 1986. Martin noted that it is the mayor's policy to include the concept of community energy systems in the redevelopment programs in Camden.

Martin reminded the audience that community energy systems are an economic development in and of themselves, in that they are tax paying entities-both property and payroll which is important in cities with eroded or eroding tax bases.

Camden has identified two potential projects: one in the south end of the city, based on a waste to-energy plant; and one in the waterfront redevelopment and city center, based on cogeneration. The system based on waste-to-energy initially will use public housing, schools and industry as anchor loads.

The center city system is based on redevelopment, existing industry and connecting public sector complexes to a privately owned cogeneration plant. This system came about through a spirit of cooperation that exists in Camden, Martin said. Campbell's Soup, a member of Camden's District Heating Assessment Work Group (DHAWG), came forward with the information that they were interested in developing the power plant. The State of New Jersey, with representatives on the DHAWG, offered to look at several planned and existing facilities as possible customers. The State also provided additional funding for the center city assessment. A memorandum of understanding is now being circulated.

Martin expects to secure funding for additional analysis and design. He feels that the benefits to Camden will be in improved tax base, air quality, reduced capital and operating costs at public facilities, and new and retrofit housing in the future. He is convinced that the DHAWG played a pivotal role in bringing the project to its current status.

Wallace McOuat, who specializes in public-private jointventures in energy projects, said he often is asked about the benefits of DHC systems and how the project participants divide them. For the answers, he said, look in these general areas:

- Inherent project economics-including: design, efficiency, initial capital cost, ownership, and cost of alternatives.
- Project performance (over time)-including load stability, skills of operating and maintenance staff, per cent availability of equipment, and degradation of equipment between overhauls.
- Future energy prices using reasonable projections.
- Choice of financing arrangements--self financing usually offer the best deal.

McOuat went on to present examples and to bring out several points that determine the answers to the questions.

- Capital costs and benefits are not necessarily related; local conditions such as cost and buy-back price of electricity and project financing can have substantial impact on benefits with little impact on capital costs.
- Project-specific conditions dictate how benefits are divided. More participants cause more work and make dividing the benefits trickier. Also, different participants can be interested in different benefits.
- Risks and how they are divided determine benefits. Risks include completion, performance, markets, pricing, regulatory changes, back-up and force majeure.

McOuat concluded by noting there are two types of errors---one brought about by making a mistake, and the second type by not proceeding with action. Type one results in direct loss equal to the price of the mistake; type two results in the longterm loss of revenue which can dramatically exceed type one losses. Finally, he emphasized the need for the project developer to have local support from high levels.

The final speaker of the session was **John Lyons**, formerly PublicWorks Director of Springfield, Massachusetts, now a consultant to the city on its district heating and resource recovery projects. Lyons said Springfield relies on private developers for projects, and is willing to allow the developers to earn the rewards by taking the risks. Springfield is confident that it can earn its rewards through negotiating favorable positions.

Springfield is trying to start its community energy system small, Lyons said. There are several potential projects based on energy from a resource recovery plant and shared energy systems in conjunction with cluster developments. Lyons explained that Springfield has lost several opportunities for district heating systems due to project timing.

He cited the example of a new downtown hotel that was interested in the capital cost and energy cost savings of districtheating, but would not commit as a customer because a system was not ready. An opportunity was lost at the resource recovery plant. Since Springfield did not have a firm thermal load

available, the plant owner decided to take advantage of very favorable electric rates offered by the regional electric grid.

Lyons feels that the necessary players are now in place, and that the development of community energy systems will soon take place in Springfield. He emphasized the need to get together with developers early in their planning in order to obtain their cooperation, and to put the needed local actions in place.

Session 8

Investor Interest in Community Energy Systems: Trends

Wyndham Clarke, *Office of Environment & Energy, HUD*

Thomas R. Casten, *Trigen Energy Corp.*

John D. Kuhns, *Catalyst Energy Corp.*

Lee Freeman, *Central Plants, Inc.*

These three system developers offered their views of the benefits of district heating and cooling to the system owner, and to the lender or equity investor. Since each owns systems but has a different preference for system type, financing and rate bases, the session presented differing approaches to offer to investors and customers, all based on considerable experience.

Central Plants, Inc. (CPI), has been developing, owning and operating alternative energy plants for the past 25 years, said **Lee Freeman**. Its inventory includes seven central heating and cooling systems in southern California, and 19 small power producing plants throughout the country. Recently, Freeman and CPI have been focusing on development of cogeneration facilities that qualify under PURPA regulations.

Central Plants was initially established in the early 1960s to develop cooling and heating central systems. It now has seven systems, including the 19-building, 13-customer system at Century City, California. This is rated at 22,000 tons of cooling and has undergone several expansions.

Freeman emphasized the need to coordinate the system investment with the development. He pointed out that it is "bad to be in a bad position" when development occurs, and that by working with the customers, the owner and customer can ensure the long-term financial and operational viability for both parties. He also noted that it is important to continually reeducate customers on the original decision to participate in a central energy system, and to remind them of the value of the costs they avoided initially.

John Kuhns, President and CEO of Catalyst Energy Corp. (owner of Catalyst Thermal and Catalyst Thermal Energy) emphasized the need for knowledgeable equity investors and lenders, and he explained why investors may or may not be interested in DHC investments. First, Kuhns assumes that only projects showing a five-year payback or less at the site using current interest rates will be pursued for either acquisition or construction by Catalyst. Kuhns presented reasons why Catalyst and its investors may be interested in a system, and reasons to carefully evaluate the project. With district heating, a company is investing in a proven business with an annuity-like revenue stream, particularly in the case of an acquisition. For an investor, the businesses have the ability if not the inclination to pay dividends, which can cover investors downside risk. This enhances the owner's ability to raise equity and pay the investors out of cash flow on a 'pay as you go' basis.

Since most systems are located in urban areas, they have the chance to grow as areas develop, offering investors an upside. This fits in well in downtowns that are experiencing rebirth and new investment. Since the owner is typically dealing with a high fixed cost and relatively low capital utilization factor, growth can be achieved easily often with little additional investment. Both the system and the growth areas benefit. He stated that DHC systems are fundamentally sound businesses, with economics based on providing a lower cost product through efficiency and alternate fuels; and that the regulatory situation is often more benign than that faced by other types of utilities.

However, Mr. Kuhns pointed out that most investors are not aware of the DHC industry, which makes fund-raising difficult. The business can be highly seasonal when limited to heating only, causing quarterly analysis, currently in vogue, not to present as good a picture as annual analysis would. He noted that the practical barriers to developing large, new, urban systems are overwhelming for a new operator. Additionally, Kuhns stressed the need for 'marketing, marketing, and more marketing' to increase capacity utilization. He said both lenders and investors are looking for cash flow; and, unlike in other industries, are more patient and willing to look at the long range prospects that DHC offers.

The final member of the panel was Thomas Casten of Trigen Energy Corp. Casten formerly was an owner of Cogeneration Development Corp., which developed one of the first modern cogeneration DHC systems in Trenton, New Jersey. Trigen has since acquired CDC and its projects. Casten spoke of the difficulties of starting new systems. He pointed out some of the pitfalls experienced by CDC, which also apply to other developers:

- Developing a project takes a long time.
- One must have the ability to renegotiate rates if necessary. Twenty-year contracts with mistakes can lead to financial difficulty.
 - Predicted loads need to materialize and not disappear through overestimation of loads and future building improvements.
 - Mistakes will be made without previous system development experience.
 - Environmentally, DHC can improve air quality by limiting the point source to the one that supplies the system. It is easier for EPA to regulate and monitor one point source than many.
 - Hot water to steam conversions are tough and must be carefully undertaken.
 - In certain cases, bills may be hard to collect and service difficult to discontinue. Customers should be screened.

Nevertheless, Casten feels that district heating and cooling offers considerable opportunity. There is a big market for the developer who will work with building owners to lower total cost and to relieve them of energy decisions, which is a low priority for building managers. DHC is not a competitive industry; there are few active system owners, and they generally do not compete with each other for customers. Ultimately, there will be upward pressure on energy supply and price giving the advantage to efficiency and experience.

Casten indicated that his firm looks for nonregulated, multi-user systems with institutional buildings as the customer base. They prefer long-term contracts of 20 years. Trigen particularly seeks opportunities for cogeneration and cooling which can levelize revenues to offset traditional industry seasonality. Finally, he pointed out that financing trends require solid deals that are not driven by investor tax appetites.

Session 9

Packaging Opportunities: Attracting System Developers

Fred Strnisa, *New York State Energy Research and Development Authority (Moderator)* Joseph Gentile, *City of Kansas City, Missouri*

Carl Avers, *Catalyst Thermal Energy Corp., Youngstown, Ohio*
 William Harrison, *Kinetic Energy Development Corp., St. Louis, Missouri*

Dr. Strnisa opened the afternoon session by introducing Kansas City's Director of Solid Waste and District Heating projects, Joe Gentile. Gentile described his role as one of working to salvage the steam system in Kansas City. About one and a half years ago, Kansas City Power and Light (KC P&L) announced to its 118 customers that it planned to abandon its 100-year-old steam system. The city then implemented a three phase study to determine its options in district heating and the steam system, solid waste, and waste-to-energy possibilities.

The first phase of the study brought together much interest, Gentile reported. The Missouri Public Service Commission held hearings, the U.S. Conference of Mayors and various federal agencies and public interest groups provided technical assistance and the local community organized to assess its options.

Gentile said the city first moved to try to retain the customer base. To prevent more customers from leaving the system, they held a workshop and brought in experts to explain options, procedures, and to help the community develop strategies.

Six months from the date of the PSC hearings, a ruling was issued that gave them an idea of how long an abandonment process could take. The PSC issued a five-part ruling favorable to the city that temporarily saved the steam system. Despite its age, the system is reported to be in good shape. The PSC ruled that:

- KC P&L must make a good faith effort to sell the system.
- KC P&L must report on its efforts to the PSC by January 1, 1989.
- If no buyer is found, KC P&L is authorized to abandon the system on December 31, 1990.
- KC P&L is not permitted to terminate service to any customer, nor may it offer free electric boilers to steam customers.
- The PSC will act as an intervenor and review KC P&L's process for fairness and good faith efforts.

Gentile is pleased with the PSC ruling and is now helping to find a system buyer.

Carl Avers, CEO of Catalyst Thermal Energy Corp. spoke from a developer and owner's perspective. Avers continued the emphasis on economic development by pointing out that district heating can be a strong economic development tool for center cities that are competing with other center cities and with suburbs. He pointed out that district heating and cooling systems are inherently more cost effective than other systems, particularly when based on solid fuels or cogeneration.

From an owner's standpoint, Avers noted that there is not much competition. There are few people or companies interested in owning and operating systems, and fewer with the interest or resources to develop major downtown systems.

Avers explained that a city with a system for sale can greatly facilitate the process by lining up local support for the sale. He used Baltimore Gas & Electric's system as an example. BG&E arranged the support from all the parties involved either directly as customers or indirectly, for example through the chamber of commerce and local government. This greatly facilitated the sale and the ownership transition. Other systems for sale have not arranged support and are less attractive to potential purchasers. A city can help both the buyer and seller by taking an active role.

Avers recommended that the city carefully check the developer's credentials to ensure that he has the financial, technical and management resources to own and operate the system over the long haul.

The final speaker was William Harrison, a senior vice-president of Kinetic Energy Development Corp., who formerly worked with Carl Avers at Catalyst Thermal. Harrison listed items or conditions that a potential owner who might be interested in an existing system for sale would investigate:

- Current financial condition-Does it make money?
- Physical condition-Has it been updated and maintained?

- Economic history--Growth? Decline? Reasons why.
- Selling price-How is it valued? Real estate, book, valued as going business.
- Local situation-Future potential?
- Local government and community attitude.
- Growth Potential--Cooling? Industrial growth? Public housing?
- What can it be built into?
- Permitting problems-Need to change fuels?
- Local utility attitude.
- Local energy prices-Room to improve costs?
- Structure of steam rates?
- Special circumstances.
- Competition from local HVAC and boiler companies.

He went on to describe what a buyer may typically find when assessing the overall system:

- Underutilized assets (capacity).
- Low or declining revenues and customer base-Why?
- High O&M costs--Steam systems often get assigned disproportionate shares of costs and unnecessary personnel.
- Systems are often on expensive fuels.
- Systems often have poor public images, and are not treated as community assets.
- Low customer opinion, low staff morale.
- Systems often are not treated as real business by senior utility management.

To turn a system around, Harrison offered the following actions that can be taken:

- Improve operational efficiencies.
- Improve fuel economics.
- Update instrumentation and controls.
- Treat system losses.
- Account for and treat in-house steam use.
- Streamline personnel.
- Motivate staff to become part of the team using tools, such as profit-sharing, etc.
- Undertake comprehensive marketing and planning.
- Involve customers.
- Promote the 'premium product' concept.
- Reconnect old customers and attract new ones.
- Develop an aggressive public relations and sales program.

He ended by reminding everyone to take advantage of district heating's economies of scale and ability to spread costs over a large number of customers.

Session 10

Comparing Customer Costs and Benefits of Community Energy Systems

Floyd Collins, *Buildings and Community Systems, DOE (Moderator)*

Ishai Olikier, *Bums and Roe, Oradell, New Jersey*

Rudy Brynolfson, *District Energy St. Paul, Inc., St. Paul, Minnesota*

William Eskew, *Resource Development Associates, Inc., Dayton, Ohio*

Floyd Collins began the session with a brief discussion of the importance of comparisons in marketing community energy systems. He then introduced Ishai Olikier, who has been active in marketing and designing district heating and cooling systems for Burns and Roe's clients.

Olikier began by stressing the concept of differential costs, and the need to get developers and building owners to consider total energy costs. Building owners and developers have little knowledge of modern hot water systems, and it is important to gain their confidence. He spoke of the need to show system advantages, including reliability, long term availability, reduced maintenance and operating cost and lower capital costs.

He recommended starting with the consulting engineers who will influence the owners' decisions. It is essential to convince the engineer to consider all the costs when comparing systems. They will universally concede avoided capital costs, Olikier pointed out, but may overlook costs for storage tanks, flues, administrative costs for purchasing oil as primary or backup fuel, structural costs necessary to accommodate heavy mechanical equipment, property taxes attributable to boilers or chillers, insurance and the other indirect costs that often do not get counted.

Burns and Roe has identified the average costs for in-building systems in buildings they have retrofitted:

\$.75/MMBtu-maintenance

\$.75/MMBtu-operations

\$.75/MMBtu-electricity

\$.10/Btu-chemicals, water, rentable floor space, etc.

These costs do not include reserves for boiler replacement, nor do they include boiler efficiencies which run from 35% to 60%. Olikier gave an example, assuming gas at \$5.00/MMBtu and 50% boiler efficiency. It showed total energy costs of \$11.85/MMBtu, not the \$5.00 the owner was paying for natural gas at the meter. Olikier has found that live examples are the best marketing tool, and takes potential customers to visit buildings on modern hot water systems for testimonials by satisfied customers.

Olikier closed by discussing steam to hot water retrofits. His experience has been that most of the existing piping and terminal equipment can be reused with minor maintenance and modification. He reported that mere conversion to in-building hot water from low pressure steam can save owners a minimum of 10%, and that connection to a district heating system can save even more.

Rudy Brynolfson started by noting that District Energy St. Paul (DESP) is past the start up phase and is moving into the next phase of marketing and growth, using the slogan "Discover the Advantage." While DESP's marketing approach starts with rates (\$9.50/MMBtu), it tries to quickly move the prospect from the rate-to-rate comparison to total cost comparison.

Brynolfson spoke of the need to deal with owners and developers using their own terms, that is, on a square foot basis rather than an energy unit basis. He talked about selling the reliability, flexibility (at the plant), efficiency and safety factors along with the initial capital cost savings.

To compete with low gas rates, DESP has instituted an incentive rate for new customers. The rate front-loads savings to the customer. DESP uses long-term contracts, and front-loading savings helps to neutralize contract length. Since much of the discount is in demand charges, other customers on the system still benefit by spreading the commodity costs over a larger base. The discounts are attractive to the architects and engineers by helping them save the building owner on initial capital and operating costs.

Brynolfson emphasized that it is important to not overlook any possible advantage and to use those advantages when developing benefit cost comparisons for customers.

Bill Eskew asked, "What market is the customer in?" Different markets-residential, commercial, industrial and institutional-look at benefits and costs differently. In retrofit situations, each market needs different paybacks, and each may need different rates.

Residential markets are tough, especially single family residences, which he would recommend connecting only if the house is on a distribution line. However, Eskew continued, multifamily units can be very attractive, both to the owner of the units and the owner of the energy system.

The rental rates of an area determine what will motivate a developer of commercial buildings, Eskew explained. If an area rents for \$11.00/square foot and the developer has budgeted \$1.75/square foot for HVAC including lighting, and if district heating can save him \$.50/ squarefoot in capital cost and space savings, the community energy system's advantage is obvious. This assumes that the energy cost is passed through to the tenant and costs are competitive. The commercial developer is most interested in reducing the first cost, which is his cost and is significant when evaluating profitability.

Eskew said industrial customers view energy as a part of production cost. They will compare energy investments to production investments to determine the most cost-effective way to spend their capital budget.

Institutional customers prefer not to have any more operating and maintenance expense than necessary and may be willing to accept higher rates and longer paybacks, he stated.

Eskew gave some examples of what had motivated customers in different projects. The examples reinforced his contention that it is important to understand how the costs and benefits are viewed by the customer, and how to incorporate this into a marketing strategy..

Session 11

Projects in Development

D.Sam Scheele, *ERG Technologies, Los Angeles, California (Moderator)*

Robert Cameron, *The Rouse Corp., Columbia, Maryland*

Jacob Fey, *City of Tacoma, Washington*

Thomas Dart, *City of Dover, Delaware*

Following a brief introduction by Sam Scheele, Robert Cameron began discussing a Rouse project now under construction in Baltimore. The project is a mixed-use highrise with hotel, retail and office space, and underground parking. The building is designed around an atrium that requires heating.

The mixed-use nature of the building presents different energy needs for the different uses, Cameron explained. If it were just an office building that required mostly cooling, they would not have used the steam system. However, the hotel had laundry requirements, and the parking garage had to be heated to protect the sprinkler system from freezing, which led to Rouse's decision to use steam.

Cameron described the internal heating system. Steam is converted to hot water to heat the garage. The office floors use a perimeter hot water system. The hotel heats the rooms using hot water, while steam is used for laundry and domestic hot water. The atrium uses a combination of steam and hot water. Cameron noted that the retail floors are heated by electric resistance, which was cheaper to install, and that the retail space did not have substantial heating requirements.

The system was designed based on the need to control tenants' energy costs, Cameron said. He pointed out that Rouse owns its projects and looks at both first costs and long-term operating costs. Energy cost control can help protect the building's tenant mix, which is important for project success. Cameron closed by describing Baltimore, the project and the relation of it to the Harbor Place project.

Tacoma has the lowest rates for municipally-produced electricity for industrial and commercial customers in the country, Jacob Fey said. This has led his city to investigate the use of electrically driven, water source heat pumps in an energy and redevelopment program.

Fey described some of the redevelopment projects now planned or underway in Tacoma. These include a rehabilitation of a train depot for federal courts, renovation of parts of the central business district, and a warehouse district.

Tacoma has several options for the water source heat pumps, Fey said. These include effluent from a waste water treatment plant, river or sea water and the effluent from a paper mill. Tacoma also is developing a multi-fuel cogeneration plant to supply thermal and electricity for use in district heating.

The city is studying the economics of the various options. Fey emphasized that the city is trying to be ready when the customers are ready.

Thomas Dart, Dover's electric director, feels that Dover and district heating are a match for each other. Using oil overcharge funds, Dover is investigating the feasibility of developing a hot water system. The system initially would be based at Delaware State College and take advantage of existing oil pre-heat boilers. Dart explained that the system would then expand into the central legislative district and would heat state office buildings using a small natural gas boiler for the additional load, as necessary.

Sam Scheele described a cogeneration project his firm developed in White City, Oregon, which began in 1981 and became commercial in 1985. Scheele pointed out that the changing economics of energy, cost of infrastructure and attitudes of independence cause projects to take time from conception to operation.

Scheele described some of the situations to look for in developing cogeneration. Process heat users such as dairies, food processors and operations that dry materials are good loads, he said. These types of heat users also permit cascading of energy from high grade to lower grade heat users.

In terms of finance, Scheele noted that industrial customers drive hard bargains. He advised looking for stable customers, since financing is based on contracts and the creditworthiness of the customers.

Look to mortgage holders as an ultimate customer, since energy contracts generally exceed tenant leases, he advised.

"Do not be discouraged by the length of time," Scheele said, "While people will start out being most interested in price, they will ultimately be interested in service and reliability, which is what can sell district heating.

Session 12

Community Energy Systems As Strategy: Nashville, Tennessee

Peter Heidenreich, *Director of Public Works, Nashville, Tennessee*

James E. Lloyd, *Director of Corporate Real Estate Financing, Cushman & Wakefield, Nashville, Tennessee*

Nashville receives over seven million visitors per year, including several hundred to visit Nashville's resource recovery/district heating and cooling plant, Heidenreich announced. He then told the audience of Nashville's commitment to resource recovery and to a utility project.

Fifteen years ago, the mayor of Nashville considered the role of resource recovery and district heating as part of an urban renewal strategy, Heidenreich explained, and formed a not-for-profit organization, Nashville Thermal Transfer Corp., to implement the project. In 1974 the system started up and in 1975 it ran into air pollution problems. At that point, the mayor made it a public policy issue, strengthening the role of resource recovery in Nashville. In 1984, the system expanded and is currently planning another expansion, he said.

Heidenreich showed slides of the plant which is located in the downtown area, and demonstrated that resource recovery plants can be "good neighbors." He pointed out that a developer has recently converted some buildings to apartments across the street from the plant, and is well pleased with rentals.

Political risks are inherent and public policy is required, he emphasized. Technical and financial resources are abundant and do not present a problem. Nashville was willing to take the risk and establish policy, which has promoted and supported new and existing development downtown. He closed by advising that the need for solid waste disposal will ultimately drive waste-to-energy projects, but that it is important to develop regional, state and national policies concerning resource recovery. He also emphasized the need for solid waste management planning.

James Lloyd is both a customer and member of the board of Nashville Thermal. He admitted that he was initially hard to convince. The project required 50% of capacity to be committed for initial financing which was hard to sell to the community; however, the economics looked good. Life-cycle cost analysis predicted 15-18% fuel savings plus additional operating savings. Lloyd became a customer.

Lloyd pointed out that when the district heating/cooling system was, being considered, inflation of energy costs was outstripping rents, and Nashville Thermal was able to stabilize long term energy costs. When he negotiated his energy contract, he agreed to accept rate increases only if operating costs increased and financing covenants required rates to increase. He later was selected as a -representative of the DHC customers to the board.

From a marketing viewpoint, Lloyd feels that Nashville's system offers several advantages. The chilled water system which operates 24 hours per day, seven days per week, matches tenant needs for computer cooling and is a good marketing tool for the system and/or downtown. Contracts require that the board be independent and have private sector representation, which has helped to keep rates cost-effective and is a good marketing tool.

The board has two Primary issues--burn garbage and sell energy. Economic development, air quality, landfill management, downtown issues and competitiveness are part of the two issues, Lloyd explained.

Financially Nashville Thermal is in good shape; Lloyd -reported the project recently was refinanced, retiring 15% of the outstanding debt. He added that they are now looking for a second plant site.

Session 13

Marketing Systems to Customers

Jack Kattner, *Minneapolis Energy Center, Minneapolis, Minnesota (Moderator)*

Kevin Brown, *Philadelphia Thermal Energy Corp., Philadelphia, Pennsylvania*

G. Michael Larkin, *Baltimore Thermal Energy Corp., Baltimore, Maryland*

Mark Spurr, *Resource Efficiency, Inc., St. Paul, Minnesota*

Kenneth Patton, *Helmsley Speer, Inc., New York, New York*

Jack Kattner opened the session by offering two ways to approach marketing district energy systems--either as selling a product or as marketing an alternative investment. He prefers the investment approach.

"How to make friends of steam" is how Kevin Brown approaches marketing. He feels that the first step is to get to know the people who make the energy system decisions. The architects and engineers (A & E's) and the developers are the important decision makers, not necessarily the building owners who will rely on the advice of their A & E's.

Steam not been actively marketed in Philadelphia for 10 years, until his company recently bought the system, Brown stated. The Rouse Corp. had built one building using an all electric system; their second building will use steam, thanks to the renewed marketing efforts.

Philadelphia Thermal tries to make it easy to connect to the steam system, Brown said. Recently the firm published a steam service manual, answering typical questions and presenting the concept of value engineering which can make the A & E's "look good."

Philadelphia Thermal publishes a newsletter concerning system activities and includes design firms on the mailing list, in addition to the system customers. It tries to be "not just another vendor or utility," he said. The company holds periodic meetings, and tries to "get on their [developers] good side" by offering incentives and savings. He added that the company has a construction heating program which uses elevator shafts as heating plenums. The builder can then eliminate propane heaters and propane tank storage problems. Most importantly, Brown said, Philadelphia Thermal gets a steam pipe in the building while making a friend.

Brown noted that it is useful to know the type of developer--is he "five years and out" or is he in for the long haul. This gives the marketer direction. Brown also feels that it is useful to get to know the mayor and city administration, and to use them as a resource.

Mark Spurr is a consultant to District Energy St. Paul. When beginning a marketing program. he said you should ask yourself three questions:

- What are we selling?
- Who are our potential customers?
- What are the strengths and weaknesses of the district heating and cooling utility?

A DHC system, he said, is selling Btu's for a price. Along with the Btu's, it is selling economic benefits of reduced capital and lower operating costs, and such intangibles as simplicity, reliability and price stability. Spurr cautioned that care be used in placing too much emphasis on price projections. The market is losing faith in projections, particularly long-term ones.

In determining who a particular customer is, the first step is to determine whether the building is a retrofit or new construction. This forms the basis for the approach and benefit package. Will the building be owner-occupied and operated? If so, this would direct the approach more toward non-economic benefits such as comfort, operational simplicity, etc. If the owner is a "five and out" type, then first cost considerations become most important, he said.

Spurr contended that the strengths and weaknesses of a DHC system depend upon the stage of its development. The system may have a good or bad track record. Selling a good track record is easier than overcoming a bad one, he added.

He then gave some examples of techniques that District Energy St. Paul (DESP) is using in its efforts to market hot water. First, since it has only been operating a short period of time, DESP focuses more on price than the non-economic benefits, including the use of discounts on demand charges as incentives for new customers.

DESP is working with a developer of a 50 acre riverfront project across the river from the main system. The goal is to establish a heat island which will serve future development. The developer is a "suburban developer" who is used to using heat pumps and was not receptive to DESP's usual approaches. In such a situation, DESP now promotes the non-economic advantages and better building environment that district heating can offer, and contrasts the heat pump problems of noise, ventilation and the lack of perimeter heating-

Spurr reminded the audience that it is important to "learn about the developer and focus on their needs" and not use a standard approach for all parties.

Mike Larkin said Catalyst Thermal develops the basic business and marketing plans for its operating companies, and then the local companies modify the plans to fit local needs. There are elements that stay in all the Catalyst plans-strong customer service, aggressive marketing and the ultimate goal of using solid fuels.

In Baltimore, Larkin has a straightforward marketing plan based on two simple tenets:

- Buy as much energy as possible from the Baltimore waste-to-energy plant.
- Add customers.

The Baltimore steam system currently purchases 80% of its steam from the resource recovery facility, Larkin said. The majority of the steam now comes from solid fuel. He added that Baltimore Thermal is also planning to relocate one of its generating plants and use coal instead of oil.

In terms of adding customers, Larkin works closely with the City of Baltimore to promote economic development along with further reductions in waste disposal costs and improved air quality while adding customers. Baltimore Thermal is discussing the purchase of the Central Avenue Steam Plant and System, which serves a large number of units of public and assisted housing near downtown. The Housing Authority of Baltimore City is committed to district heating and would be pleased to eliminate the aggravation of operating this steam system. This expansion project was identified in a district heating and cooling feasibility assessment jointly sponsored by HUD and DOE. The assessment serves as a basic document for targeting marketing direction, Larkin said.

He stressed the importance of working with the city in identifying and pursuing projects. For example, Larkin works with the Mayor's Energy Office, Housing Authority of Baltimore City and Baltimore Economic Development Commission, among others. In addition, he maintains contact with

federal agencies, such as HUD, DOE and the General Services Administration, which owns and operates federal buildings. The city and federal government are supporters of district heating and Larkin feels that they have provided support and direction in Baltimore.

Kattner reminded the audience that Donna Fitzpatrick of DOE had emphasized the need to look to anchor and leadership loads such as those being pursued in Baltimore. He then introduced Ken Patton, who served as the designated critic. Patton offered the following comments and advice: ,

- Anchor tenants are important; they typically bear more of the cost and help keep smaller customers on the system. o Sometimes people do not like dependence on central heating systems; they feel a loss of control.
- Sell summer air conditioning; it costs building owners more than heating. - Look for institutional joint venture partners.
- Old production facilities are often mislocated for today's development; geographic position is important
- There are few discretionary cost items in a building. The heating system is one of them, so dollar savings in system capital is an important budget item.
- Reliability is important.
- Heat pumps are not as comfortable as DHC and are an unknown cost item in the long run.
- Sell safety, security and modernity.
- Financing is now more important than depreciation.
- Marketing efforts should be directed at the building's principal tenant.

Patton reminded the audience that the market is competitive and there are opportunities for sales if the approach is correct.

Session 14

New Directions for Utility-Owned Systems

Stuart Temple, *PPI Consultants, Kensington, Connecticut (Moderator)*

Scott Spettel, *City of Eugene, Oregon*

Patricia A. Valante, *Consolidated Edison, New York, New York*

David Peterson, *Detroit Edison, Detroit, Michigan*

In his introduction, Stuart Temple pointed out that there has been much change in the industry in recent years, and that these changes have brought about a rededication to community energy systems. He then introduced the panelists and explained that they represent examples of the rededication the industry is seeing.

David Peterson reported that Detroit Edison has owned and operated a steam system since 1903, but that not much good had happened to the system in the last 15 years.

Like other utility companies, Detroit Edison had seen itself as an electric company that happened to own a steam system. The steam system was treated as a corporate stepchild, Peterson said; there was one profitable year in the last 15.

A few years ago, Detroit Edison signed a contract with the City of Detroit to purchase the steam output from a major resource recovery plant under construction. In 1986, management undertook a strategic evaluation, of the steam system. The evaluation identified several options, including abandonment, selling the system, continuing present operations, and making a concentrated effort to reorganize the system and make it profitable. Detroit Edison selected the last option.

They began by structurally reorganizing the steam department under one roof, separate from the control of the utility's electric side. The management team is now operating the steam system as a business, not as a regulated utility. They have established a short term plan that requires a two-year payback on capital investments, and operating and maintenance decisions are based on reasonableness and cost of steam sold. The strategy has been successful; the company has stabilized the customer base and stopped the revenue decline, reversed the negative operating income trend, and reduced the steam selling price.

To accomplish this, the company increased the steam sales force and technical support staff, while reducing the overall staff level. It has begun cogeneration and has retired the oldest and smallest plant. Detroit Edison is now implementing a number of sales and management controls which Peterson predicted will continue the turnaround.

Patricia Valente discussed Consolidated Edison's Steam Air Conditioning Rebate Program. The Con Ed steam system has over 2,000 customers, of which 460 are both heating and air conditioning customers. These 460 account for 70% of steam sales, she said.

Valente said that steam air conditioning sales had been declining. As customer equipment approached the end of its useful life, customers were replacing steam driven equipment with electric air conditioning due to the capital cost advantages of electric replacement equipment. She added that Con Ed had not had any new steam-based air conditioning customers since the 1970s, and it was not competitive outside the commercial market.

Con Ed evaluated how the steam system could help the electric side by peak shifting and thereby reducing electric demand. Valente explained that the rebate program was designed to do this and was based on offsetting the least-cost addition to the electric system.

Con Ed grants rebates for both retrofits and new construction. Rebates of \$100/ton not to exceed 50% of equipment cost for minor modifications, and \$230/ton for major rebuilding, are available for retrofits. In new construction, rebates are set at \$230/ton.

Valente said that the rebate program has captured 10,000 tons of air conditioning that was not switched to electric. The program has displaced 22 MW of electricity, she estimates. This has bought cheap capacity for the electric side of the utility, saving load for the steam system.

The district heating system in Eugene, Oregon, almost went out of business a few years ago, said Scott Spettel; but rather than shut down, the city decided to renew its commitment to the system.

The system started as part of a municipal cogeneration utility that used local waste for fuel. Three anchor loads accounted for 60% of total thermal sales. In the mid 1960s, high fuel costs coupled with Eugene's rate structure, which required full cost rates, almost caused the end of the system. The city utility gave the customers the opportunity to choose the type of service they preferred, Spettel said. The customers decided to stay on the system. The utility then guaranteed long term supply, eliminated any subsidies that existed in the rates and determined to increase utilization factors by adding new customers. Recently, Eugene and the University of Oregon decided to merge their district heating systems.

Eugene plans to expand its service area to include a new riverfront research park. Spettel said the decision to expand was based on a verification of capacity, cost equivalency and the potential for joint operational savings. While the city has looked at other expansions, it has elected not to pursue them due to economic feasibility. In other cases, Spettel noted that the utility is assisting in financing customer costs.

Stuart Temple recapped the session by emphasizing that the three utilities, along with others, have effectively utilized existing resources and capabilities. He advised utilities to look inside for help and take advantage of what they have.

*Session 15***Community Development Energy Strategies**

Andrew Euston, *Office of Environment & Energy, HUD (Moderator)*

Richard Glick, *Portland Energy Commission, Portland, Oregon*

John Deakin, *City of San Francisco, California*

Rita Norton, *City of San Jose, California*

Richard Zelinski, *Public Technology, Inc., Washington, D.C.*

Andy Euston opened the session by pointing out that 85% of the population of the United States lives and works in urban areas. "We are not looking at our energy interests in the cities," he said. "Energy planners are fading away as urban employees." Euston did point out, however, that cities are broadening their economic development issues by including energy in their strategies. He then introduced representatives of some of the cities that are using energy to influence their community development programs.

Richard Glick began by describing Portland's commitment to energy understanding and conservation. He reported that it began with a Mayor's Energy Policy in 1975. This report detailed Portland's sources and uses of energy, plus conservation options available. In 1979, a comprehensive energy conservation policy was adopted. Glick explained that the policy established goals which were to be achieved through the use of incentives plus mandatory residential weatherization. Pacific Power and Light supported the policy at the time it was implemented, he added.

Since that time, Portland has undertaken a number of steps to meet the established goals. An energy commission was created to track energy trends -and make recommendations. Portland also has set up a nonprofit conservation corporation funded through repayments of an Urban Development Action Grant from HUD that was originally used to finance industrial development. The conservation corporation also receives funding from the Bonneville Power Administration.

Portland also is active in developing other sources for energy supply, including hydropower from the city's water supply. Portland recovers and markets methane and sludge, and the city is active in solar planning.

The city's current energy conservation direction is targeted at several groups, including low income and renter households which are difficult to reach, Glick said. Portland is undertaking a block to block, low cost - no cost weatherization program. A package of weatherization incentives was developed and is being marketed to owners of multi-family units. The incentives include energy audits, rebates, state tax credits, and loans depending upon fuel used.

In the future, Glick predicted, the Pacific Northwest will see its current surplus of power dwindle as the aluminum industry returns to its former prominence and power demand. This will necessitate reassessing the area's energy policy. Glick also reported that Portland is considering resource recovery and district heating and cooling as part of its energy plans for the next 10 years.

John Deakin is San Francisco's Director of the Bureau of Energy Conservation in the city's Division of Public Works. Deakin sees his role as promoting energy efficiency in public buildings and influencing the private sector to become more energy efficient.

Currently Deakin is involved in the planning of a major, mixed-use development in the Mission Bay area of San Francisco. Deakin anticipates Mission Bay to ultimately include 7,000 to 8,000 housing units, 4 million square feet of office space, 2.5 million square feet of light industrial and research uses, a 500 room hotel and 300,000 square feet of retail space. The project is to be developed by the railroad that owns the land. The city is participating in the site planning. Deakin's goal is to make the development efficient. He also wants to retain dollars in the city's economy by reducing the amount of energy imported into San Francisco.

Deakin developed a list of 50 measures that would be appropriate for use at MissionBay. He said it is important to understand the interjection points--those times and places where a project can be influenced. In the Mission Bay project, Deakin used California's environmental review procedures to interject energy as part of the project's negotiated permit. District heating and cooling is one of the 18 measures left from the original 50 he had proposed.

Deakin feels that "carrot and stick" approaches are techniques that can be useful in persuading developers to include energy in project planning. Technical assistance, marketing ideas to developers, and internal code evaluations for consistency on energy policies also are approaches that should be used.

He emphasized the need for local energy planners and managers to promote urban self sufficiency. These people need to provide direction and a vision, and to show others how energy efficiency can help, Deakin said. He added that energy planners need better methodologies for analyzing and evaluating options, and they need to establish ways to have more influence in project planning.

Rita Norton, San Jose's energy manager, believes that a sustainable city is the goal. She believes that it is useful to transfer a city's typical "crisis planning" methods to future and long term issues. She prefers to use applied programs and intends to expand San Jose's energy mission.

Norton explained that energy strategies should be directed toward achieving planned outcomes. She cited the following planned outcomes as examples:

- The need to avoid future fuel dislocations. She recommends a 20-year time frame for planning.
- Reductions in operational costs in public facilities.
- Attract and retain business. She noted that this can connect energy to a major city agenda item.
- Recycle utility dollars. She spoke of retaining dollars spent on utility bills in the local community for longer periods.
- Complement related environmental issues. She used the example of waste to energy plants needing thermal markets.
- Integrate planning with utilities by finding common ground, such as load shaping, peak shaving and off-peak sales.

Norton described a pilot project in San Jose that will incorporate many of the above energy issues. She described the project as a high-tech, enterprise zone, incubator project.

Richard Zelinski is with Public Technologies, Inc., which staffs the Urban Consortium for energy issues. According to Zelinski, cities care little about energy, and energy is a low priority on the general city agenda. However, he continued, energy often is a hidden component of major objectives, such as solid waste management and economic development.

Zelinski stressed the need for strategic planning and the need to fit energy issues into planning. "You must work at it," he said. It is a good idea to promote energy partnerships on projects with commonalities, and to find projects with 12 to 18 month durations in order to work on do-able projects.

Session 16

Buyouts and Bailouts

William Hanselman, *Dayton, Ohio (Moderator)*

Michael Howard, *Boylan, Brown, Code, Fowler, Randall & Wilson, Rochester, New York*

Richard Strong, *Philadelphia Thermal Energy Corp., Philadelphia, Pennsylvania*

William Allen, *Kent County, Michigan*

Following a brief discussion of the changing face of the downtown steam industry, Bill Hanselman introduced the three speakers.

Mike Howard began by asking a rhetorical question: "What in the world could ever convince a group of public and private sector volunteers with no experience in district heating to believe that they could acquire, own, finance and operate a district heating system which had been run by the utility since 1899, given the fact that the utility had conclusively concluded that the system should be abandoned?"

Howard explained that a co-operative in Rochester, consisting of 31 members and 40 buildings from both the public and private sector, did just that. The co-operative, Rochester District Heating (RDH), was formed in response to Rochester Gas & Electric's decision to abandon its system.

Building owners on the steam system were faced with the prospect of installing boilers and related equipment, and operating and maintaining those boilers. That was something few owners wished to do. They recognized that buying the system would be difficult, especially since RG&E had proclaimed that the steam system was not for sale. In fact, a third party had already tried to purchase the system and was rebuffed, Howard said. The steam customers decided it was worth the effort.

The first thing RDH needed to do, according to Howard, was establish credibility with the public and RG&E. The City of Rochester had applied for and received a grant from the New York State Energy Research and Development Authority to evaluate saving the system. The grant, along with additional funds, was used to help them organize and carry out the acquisition. This brought together leaders from both the public and private sectors with a common goal: continued steam service in downtown Rochester. They discovered that forming a cooperative offered the group the best chance of purchasing and preserving the steam system.

Howard, RDH's attorney, pointed out that the co-operative form of organization has both strengths and weaknesses. Among the strengths are:

- The ability to draw upon a wealth of community talent.
- Broad community support for its goals.
- There is "something for everyone," from lower steam costs to tax savings.
- The co-operative reflected the unique concerns of the particular community,
- and the interests of the membership and the greater community are largely coincident.

Howard explained that by adding load in the downtown, the unit cost for energy goes down for all. Since RDH revenue must equal expenses plus reserves, this helps encourage downtown development. The co-op has unique standing with both corporate and government sectors of the community, and it was exempted from utility regulation due to its status and member contracts.

Howard then described the disadvantages that the co-operative form of business faces. The corporate structure is decentralized and diffused; the board members are volunteers and generally have considerable responsibilities at their place of employment; the co-operative faces unique legal issues, including federal and state tax status and organizational matters. In Rochester, there were problems related to simultaneous negotiations and closings with many parties. These made organizing the co-op difficult, but not impossible.

Richard Strong said that Catalyst Thermal Energy is interested only in projects that can achieve a "four-way win"; that is, a situation where the customers, utility company, city and Catalyst all can benefit from the sale of the steam system.

Strong felt that the 'win' was achieved in Philadelphia. The steam system has 450 customers, including nine hospitals and three universities, and is one of the larger steam systems in the country.

He feels that Catalyst Thermal Energy benefits communities in its buyouts due to its strong proven track record, very high managerial strength, strong technical expertise, financial resources and ability to work closely with cities to promote district heating as an economic development tool.

When Catalyst Thermal Energy purchases a steam system, the company moves quickly to establish itself in the community. Strong listed six policies the company immediately addresses:

- Establish strong customer confidence
 - a. Use aggressive marketers
 - b. Take over operations quickly
 - c. Install strong management controls
 - d. Recruit and train new people quickly
 - e. Grow the system-focus on customers
- Emphasize people and service
- Only provide energy
- Address the environmental aspects of the system
- Establish market positioning as specialists
 - a. Demonstrate customer service
 - b. Emphasize long term commitment to the city
- Demonstrate strong marketing and follow up marketing with service

Strong also pointed out that Catalyst Thermal Energy almost immediately comes into competition with the local natural gas company. He feels that this competition is good for the community, since it benefits customers with better rates and service.

William Allen explained that Kent County, Michigan bought the steam system in downtown Grand Rapids to protect the interests of the county's investment in a waste-to-energy system. He said that Kent County had identified the steam system as the best market for the thermal output of the resource recovery plant. At the same time, Consumers Power, the local utility, was being forced to raise money by the Michigan Public Utilities Commission due to unrelated financial requirements. The steam system was profitable, Allen said.

Allen reported that Consumers Power felt that the steam system and its customers would be best served by public ownership, even though the utility had been approached by cogenerators. The system was in typical shape, he said; it suffered from "benign utility neglect" and does not return condensate.

Kent County initially had Consumers Power continue to run the steam system, but is now phasing out the operating contract with the utility. The county plans to base load the system with steam from the resource recovery plant and use the existing oil and gas boilers for back-up and peaking. Allen said that the county has negotiated a good gas supply price and recently lowered the steam price by \$1/Mlb.

Since public ownership is not regulated in Michigan, Kent County has worked hard to maintain good customer relations, Allen said. An advisory committee has been appointed to oversee operations. He added that the system has benefitted from development in the central business district during the last 10 years, and that Kent County is looking forward to operating both the steam system and the resource recovery plant in the future.

Session 17

Piggy-Backing on Major Capital Investments '

Eliot Allen, VBB Allen, Salem, *Oregon (Moderator)*

Ruth Hertz, *Seattle Metro, Seattle, Washington*

Michael Wiser, *Trigen Energy Corp., New York, New York*

Rita Norton, *City of San Jose, California*

Eliot Allen, in his introduction, mentioned that important opportunities may be found by tying in with other community development projects. Often, capital improvement projects have major support and can bring in community energy systems, he said. These kinds of projects offer windows for community energy development. He included neighborhood revitalization, urban renewal, economic development and other projects that have area-wide impacts for investigation.

Allen asked, "Why should this be pursued?" He explained that there can be an economic advantage in such areas as shared construction costs in street openings and central plant facilities, and there can be mutual goal support. Joint development exposes both the construction and energy projects to broader constituencies, offers opportunities for public-private partnerships, exposes anchor customers, increases access to financing and may lead to shorter implementation schedules. Allen then introduced the panelists.

Ruth Hertz explained that Seattle Metro is a special purpose unit of government with responsibilities in the areas of public transit and water pollution control. She discussed how a district heating project in Seattle is piggybacked on an effluent transfer system.

When Seattle Metro doubled its wastewater treatment plant's capacity to 72 MGD and built a 12-mile underground effluent pipeline to Puget Sound, Gordon Bloomquist of the Washington State Energy Office approached Seattle Metro concerning using this effluent as a heat source. They received a Phase I grant from Washington State to evaluate the project's potential.

Hertz went on to say that the energy potential of the effluent exceeds the demand potential that now exists. In the evaluation, five potential areas for heating service were identified; however, only one turned out to be economically feasible.

Seattle Metro is now engineering a direct use connection for a Container Corp. box plant. This will be a four-inch line delivering 130° F water. She added that the wastewater treatment plant was designed for waste heat recovery and heat pumps, and that Seattle Metro will operate the heating plant but has more long term interest in marketing the plant as a potential cooling operation.

Michael Wisner spoke of the role of public-private partnerships in the development of projects. In Trenton, it began with a grant from the Energy Research and Development Administration, a forerunner to DOE, under the Integrated Community Energy Systems program. Mayor Arthur Holland later applied for and received an Urban Development Action Grant from HUD, which kept the project alive and ultimately helped with the energy system financing.

Wisner said that in the late 1970s, the economic structure of Trenton was changing from industrial to government. This was a result of Mayor Holland convincing the State of New Jersey to keep its offices in Trenton and to reinvest in the city. A cogeneration district heating system was developed, with financing based on the strength of the contracts with state government. Wisner added that a district cooling system is being built to complement the heating and to improve the cogeneration system economics.

Trigen is involved with other energy projects in other places, including in Nassau County, Long Island, and Newark, New Jersey. In Nassau County, Trigen purchased a plant originally developed by the county to serve a commercial park. The energy system served to strengthen the development potential of the area. In Newark, Trigen is evaluating potential district heating and cooling development. Wisner believes that there is a strong market for building retrofit. But, he admits, there is an environmental problem siting a fuel-burning heat source. Trigen is hoping to tie into and piggyback on a proposed resource recovery plant, he said.

Rita Norton, San Jose's energy manager, said that her city began by looking at the feasibility of developing a cogeneration system to serve a proposed convention center and related buildings. The city has a Phase II grant to investigate costs and sizing for a 1.5 MWe heating and cooling system for the convention center, library and two hotels; San Jose also received Phase I grant from DOE to evaluate other areas of the city for community energy system development.

The city is particularly interested in areas of new construction where energy can piggyback. Norton is now investigating the feasibility of including a community energy system in an Enterprise Zone targeted at high-tech businesses. She said energy is just one of the tools being planned for the area. Other tools include tax abatement, construction tax suspension and employee training.

San Jose's city council has adopted a policy for the redevelopment agency that will include energy saving options in major capital projects. Norton stressed the need for energy master planning and for working with the architect and the rest of the project team early in the development process.

Session 18

Energy Efficiency in Economic Development Projects

William Eskew, *Resource Development Associates, Inc., Dayton, Ohio (Moderator)*

Phillip L. Van Huffel, *Energrid Capital Investments, Ltd., Grand Rapids, Michigan*

John Wolfert, *Melvin Simon Associates, Indianapolis, Indiana*

Richard Anero, *Brooklyn Navy Yard Development Corp., Brooklyn, New York*

William Eskew provided the introduction and turned the session over to the panelists.

Phillip Van Huffel defined cogeneration as "sequential generation of electric and thermal [energy] from the same fuel source." He went on to explain the efficiency in cogeneration, and noted that the basic, fundamental efficiency can be used in economic development.

To make a project feasible, he said, both technical and economic conditions must be met. Technically, a good balance of electric and heat demand is required, both on a time-of-day and seasonal basis. This requires matching loads in planning and selecting tenants. He noted that different types of tenants operate different hours and for different durations. For example, industry may operate on an 8, 16 or 24-hour basis; commercial operation is usually for 12 to 14 hours per day; and institutional and residential customers have 24-hour needs. This highlights the need for load matching and planning.

When selecting equipment, it is always a compromise situation, he said. In industrial applications, he feels that topping cycle cogeneration systems are best suited. It is wise to plan equipment so that modular increments of capacity for operation and expansion are possible.

Economically, capital costs dictate that cogeneration be the prime source of energy. Van Huffel said care should be taken in considering the sources of funding and the cost of capital. The capital recovery period is critical in evaluating projects using private capital for financing. Municipally funded projects have different agendas and capital recovery is not as critical.

Van Huffel discussed several projects in Michigan. Generally, these projects, he said, are wood-fired or waste-to-energy cogeneration systems connected to industrial parks of 80 to 100 acres each. Cogeneration provides the lowest cost energy he said, and that energy along with public-private cooperation can greatly influence economic development.

John Wolfert works for a major developer that owns and operates more than 50 shopping malls. Two dozen of these have central cooling plants, he said. One of his responsibilities is to monitor energy consumption in these malls and to select the most advantageous system for any new mall.

He offered the following general retail space analysis for a shopping center's small tenants. He said that 50% of energy used is for store lighting, which has an impact on cooling; 25% is energy used in cooling; 12.5% in ventilation; and the remaining 12.5% is used for Christmas lighting, elevators, maintenance, heating and miscellaneous uses. Major stores usually own their own equipment, he added.

In 1974 the shopping centers used 40 KWH of electricity per square foot per year, he said. Currently, an uncontrolled center uses 38 KWH per square foot per year. The square foot use drops to

34 KWH with central plant cooling, 30 KWH with an energy management system, and down to 28 KWH per square foot per year with a variable air volume distributed air conditioning. When the costs are spread over 400,000 square feet or more, and with electricity costing up to \$.12/KWH, the savings can be substantial, Wolfert noted.

In terms of construction costs for a mall with 400,000 square feet of retail space and 150,000 square feet of public space, Wolfert said that individual roof top units would cost approximately \$4 million, a central chilled water system would be around \$5 million and a variable air volume system would be approximately \$4.5 million to install. He said that based on his experience with operating, maintenance, financing costs and amortization, the annual cost of roof top units or chilled water systems is about \$1.50 per square foot, while the central air movement systems cost is about \$1.30 per square foot.

Wolfert noted that his company uses many energy saving techniques including heat recovery, storage, alternate fuels and energy management systems where appropriate.

Richard Anero said that he is in the economic development business, developing businesses and jobs at the Brooklyn Navy Yard; he does not want to be in the energy business. Right now he is a redistributor of power at rates 18% to 35% higher than the local utility charges. He hopes to use cogeneration to reduce those energy costs, because he believes that businesses need reasonably priced energy.

Because of the mixed use nature of the Navy Yard it has taken time to package a cogeneration system, Anero said. In order to help the development, he is holding back 25 acres of industrial land for a cogenerated heat user. He wants a turnkey developer to build the system, and he also would like to tie in the surrounding units of public housing as a heating customer. Anero admitted that right now the tenant mix he wants is hard to find; but added that he is a patient developer.

Session 19

Mayors' Luncheon and Presentation of the Norman R. Taylor Award

Doug Sutherland, *Mayor, City of Tacoma, Washington*

Wyndham Clarke, *Office of Environment & Energy, HUD*

Ken Linwick, *President, Minneapolis Energy Center, Minneapolis, Minnesota*

Stuart C. Sloame, *Deputy General Counsel, HUD*

Richard Neal, *Mayor, City of Springfield, Massachusetts*

Bill Harris, *Mayor, City of Lincoln, Nebraska*

Mayor Sutherland, as Chairman of the U.S. Conference of Mayors Energy and Environment committee, welcomed everyone to the final session of the conference. District heating is an important issue, he said, and one that can help solve the solid waste crisis facing urban America while not creating other environmental problems. He also stressed district heating's potential to conserve expensive electric energy and to offer energy at lower prices.

Wyndham Clarke introduced the 1988 recipient of the Norman R. Taylor Award, Ken Linwick, President of the Minneapolis Energy Center. Linwick began his career at the Franklin Heating Plant in Rochester, Minnesota, and rose to general manager during his 20-year career, Clarke said. He then took over the steam and chilled water system in Minneapolis, which has grown 600% during Linwick's tenure. For his service to the industry and to the community, Clarke presented the award to Ken Linwick.

In accepting the award, Linwick stressed the importance of IDHCA to his career, and the contributions of Norm Taylor to the district heating and cooling industry. He emphasized the positive role of federal, state and local governments in the resurgence of the industry.

Clarke introduced Stuart Sloame who, he said, was pivotal in maintaining HUD's role in district heating. Sloame introduced the mayors on the panel.

Mayor Richard Neal of Springfield, Massachusetts, thanked HUD for its continued support in resource recovery and district heating. He then- asked, "What happened to the energy crisis? Does anyone really believe that it is truly behind us?" He challenged the audience to remain watchful.

Sloame then introduced luncheon speaker, Mayor Bill Harris of Lincoln, Nebraska. Mayor Harris described Lincoln's district heating and cooling project. Lincoln has some basic, fundamental things in place that support district heating and cooling. It is not a new solution, but an old one, he said.

Harris said he feels the United States has taken liberties with energy use. Other countries have not; unlike the U.S., they treat energy as a scarce resource. Although the oil crisis of the 1970s changed our lives for a short while, the U.S. still relies on imports for approximately 40% of its oil supply; and, Harris said, all our economic policies rely on low energy prices. He remarked that all inflation, excluding war-related inflation, has been based on oil prices. Lincoln is undertaking a community effort to solve a community problem. The district heating and cooling system being planned in Lincoln is based on community resources. Harris explained that Lincoln has a city-owned electric company that formerly operated a steam system downtown. He noted that the University of Nebraska has a steam system serving the main campus and the state government center. Lincoln is revitalizing the old Haymarket area of downtown and is working with a developer to undertake a major renovation of a multi-block area in the city center. The city's wastewater treatment plant is near the downtown area, and the city sits above a major saline aquifer. These will play a part in the planned system.

Like many urban redevelopment projects, Harris explained, the one in Lincoln was short on funding. Therefore, the city is using DHC to pick up some of the financial gap by displacing some of the building mechanical costs. The system will initially use heat pumps with the aquifer as a thermal source and

ultimately switch to effluent from the waste water treatment plant. The concept is environmentally sound, and offers long life, thermal storage and low-cost operation, and will effectively reduce Lincoln's dependence on outside sources of energy.

Harris added that Lincoln is now looking at other applications for similar systems that could ultimately be connected. He believes that these energy applications will provide long-term benefits for the businesses and people of Lincoln. He closed by thanking HUD and DOE for their support of these energy initiatives.

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